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IS 2321 (1963): Requirements for General Purpose Amplitude Modulated Radio Frequency Signal Generators (30 kc/s to 30 Mc/s) [LITD 8: Electronic Measuring Instruments, Systems and Accessories]



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Indian Standard

**REQUIREMENTS FOR GENERAL PURPOSE
AMPLITUDE MODULATED RADIO
FREQUENCY SIGNAL GENERATORS
(30 kc/s TO 30 Mc/s)**

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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REQUIREMENTS FOR GENERAL PURPOSE AMPLITUDE MODULATED RADIO FREQUENCY SIGNAL GENERATORS (30 kc/s TO 30 Mc/s)

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Indian Standard
**REQUIREMENTS FOR GENERAL PURPOSE
AMPLITUDE MODULATED RADIO
FREQUENCY SIGNAL GENERATORS
(30 kc/s TO 30 Mc/s)**

0. F O R E W O R D

0.1 This Indian Standard was adopted by the Indian Standards Institution on 14 January 1963, after the draft finalized by the Electronic Equipment Sectional Committee had been approved by the Electro-technical Division Council.

0.2 The object of this standard is to recommend certain minimum levels of performance that should be expected of general purpose amplitude modulated (sinusoidal modulation) radio frequency signal generator operating in the frequency range of 30 kc/s to 30 Mc/s intended for general purposes such as aligning broadcast radio receivers, servicing, etc.

0.2.1 This standard also covers characteristics that are to be included in the manufacturer's specification for individual instruments and it is anticipated that this standard would ensure a uniform presentation of these characteristics by manufacturers.

0.2.2 This standard does not cover general requirements, such as climatic, mechanical and physical requirements. With regard to safety requirements, the signal generator should satisfy the requirements of IS : 616-1957 Indian Standard Code of Safety Requirements for Mains-Operated Radio Receivers, in so far as it is applicable to this standard.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.4 This standard is intended chiefly to cover the technical provisions relating to the requirements of general purpose amplitude modulated radio frequency signal generators (30 kc/s to 30 Mc/s), and it does not include all the necessary provisions of a contract.

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1. SCOPE

1.1 This standard covers recommendations for minimum performance requirements for general purpose radio frequency amplitude modulated (sinusoidal modulation) signal generators operating in the frequency range of 30 kc/s to 30 Mc/s.

1.1.1 In this standard, AC mains operated as well as battery operated signal generators are covered.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions included in IS : 2320-1963 Methods of Measurements for Amplitude Modulated Radio Frequency Signal Generators (30 kc/s to 30 Mc/s) shall apply.

3. GENERAL

3.1 The performance requirements recommended in this standard are to be measured by the test methods prescribed in IS : 2320-1963 Methods of Measurements for Amplitude Modulated Radio Frequency Signal Generators (30 kc/s to 30 Mc/s).

4. OUTPUT SIGNAL FREQUENCY

4.1 Frequency Range — Frequency range shall be within 30 kc/s to 30 Mc/s.

4.1.1 The entire range may be divided into a number of bands; a typical example being as follows:

30 kc/s	to	100 kc/s
100 kc/s	„	300 kc/s
300 kc/s	„	1 Mc/s
1 Mc/s	„	3 Mc/s
3 Mc/s	„	10 Mc/s
10 Mc/s	„	30 Mc/s

NOTE — The number of bands and the boundary frequency values are not standardized.

4.1.2 The boundary frequencies of each band shall be so adjusted that the upper end of a lower band overlaps with the lower end of the next higher band. The minimum overlap in the boundary frequencies of adjacent bands should be at least 4.0 percent of the highest frequency of lower band to ensure continuous coverage.

4.2 Frequency of Internal Calibrator — The frequency of an internal calibrator, if incorporated, shall be a round figure such as 100 kc/s or 1 Mc/s.

4.3 Frequency Calibration Error — The basic calibration error at any setting of the frequency shall not exceed 2.0 percent of the scale reading.

4.4 Frequency Drift — The frequency drift measured over a period of one hour at intervals of 10 minutes shall not exceed 0.05 percent.

4.5 Frequency Change Due to Load — The maximum frequency change due to load shall not be more than 0.1 percent.

4.6 Frequency Change Due to Modulation Applied — The maximum change in mean carrier frequency due to application of modulation shall not be more than 0.05 percent.

5. OUTPUT VOLTAGE

5.1 Output Voltage Range — The output voltage range, in the absence of modulation, shall be at least from $2\mu\text{V}$ to 100 mV.

5.2 Calibrated Voltage — The minimum calibrated voltage available shall be at least $3.0\mu\text{V}$.

5.3 Voltage Marking — The output voltage markings shall be in microvolts or in millivolts.

5.4 Basic Error of the Output Voltage — The basic error of the output voltage level at any setting above $10\mu\text{V}$ in all the bands shall be less than 20 percent and that below $10\mu\text{V}$ shall not be greater than $2\mu\text{V}$.

5.5 Carrier Level Shift — Due to application of sinusoidal modulation to a depth of 30 percent, the carrier level shall not fall by more than 5.0 percent of the original value.

5.6 Residual Output Voltage — The residual output signal voltage shall not exceed $2.0\mu\text{V}$.

5.7 Carrier Distortion — The distortion of the carrier frequency of the output signal shall not exceed 10.0 percent.

5.8 Unwanted Modulation

5.8.1 Unwanted Amplitude Modulation — The depth of unwanted amplitude modulation (noise level) of the carrier shall not exceed 2.0 percent.

5.8.2 Unwanted Frequency Modulation — (Under consideration).

5.9 Leakage

5.9.1 Radiation Leakage — The intensity of electromagnetic field produced in any direction at a distance of one metre from the generator shall be less than $5.0\mu\text{V}$ per metre in all bands.

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5.9.2 Supply Lead Leakage — The voltage level of the carrier signal leaking into the mains leads shall not exceed 30 μ V.

6. MODULATION

6.1 Internal Modulation

6.1.1 The frequency of the internal modulation signal shall be either 400 c/s or 1 000 c/s.

6.1.2 The frequency error of the audio frequency modulation signal shall not exceed 10.0 percent.

6.1.3 The depth of modulation shall normally be adjusted to a depth of 30 ± 6 percent or be capable of being set to any value up to 30 percent.

6.1.4 The envelope distortion at 30 percent modulation shall not exceed 10.0 percent.

6.2 External Modulation

6.2.1 Where external modulation is provided, the signal generator shall be capable of being modulated by an external audio signal in the frequency range of 50 c/s to 7 500 c/s to a depth of 0 to 50 percent.

6.2.1.1 The requisite voltage level of external modulating signal shall be specified.

6.2.2 The impedance at the external modulation terminals shall be not less than 5 000 ohms.

7. INFLUENCE OF EXTERNAL OPERATING CONDITIONS

7.1 Influence of Temperature

7.1.1 On Frequency — The maximum change in the value of frequency over an ambient temperature range of 10° to 50°C, shall not exceed 30 percent of the permitted tolerance for frequency calibration error (see 4.3).

7.1.2 On Output Voltage — The maximum change in the value of output voltage over an ambient temperature range of 10°C to 50°C shall not exceed 30 percent of the permitted tolerance for basic error of the output voltage (see 5.4).

7.1.3 On Modulation — The maximum change in the depth of modulation over an ambient temperature range of 10°C to 50°C shall not exceed 30 percent of the permitted limit for the envelope distortion (see 6.1.4).

7.2 Influence of Mains Voltage

7.2.1 On Frequency — The maximum change in the value of frequency for a mains voltage variation of ± 10 percent shall not exceed 30 percent of the permitted tolerance for frequency calibration error (see 4.3).

7.2.2 On Output Voltage — The maximum change in the value of output voltage for a mains voltage variation of ± 10 percent shall not exceed 30 percent of the permitted tolerance for basic error of the output voltage (see 5.4).

7.2.3 On Modulation — The maximum change in the value of modulation for mains voltage variation of ± 10 percent shall not exceed 30 percent of the permitted limit for the envelope distortion (see 6.1.4).

7.3 Influence of Battery Voltage

7.3.1 The maximum change in the value of frequency for a reduced battery voltage of 1.10 V per cell in series in case of primary batteries and 1.8 V per cell in the case of secondary batteries shall not exceed 30 percent of the permitted tolerance for frequency calibration error (see 4.3).

7.3.2 The maximum change in the value of the output voltage for a reduced battery voltage of 1.10 V per cell in series in case of primary batteries and 1.8 V per cell in the case of secondary batteries shall not exceed 30 percent of the permitted tolerance for basic error of the output voltage (see 5.4).

7.3.3 The maximum change in the value of modulation for a reduced battery voltage of 1.10 V per cell in series in case of primary battery and 1.8 V per cell in the case of secondary batteries shall not exceed 30 percent of the permitted tolerance for the envelope distortion (see 6.1.4).

8. IMPEDANCE

8.1 The impedance of the load at various output levels of the signal generator shall be specified in the technical manual. It shall not be more than 50 ohms.

8.2 Artificial Aerial — The characteristics of artificial aerial to be employed, with the signal generator shall be specified.

9. TECHNICAL MANUAL

9.1 The technical manual for the signal generator shall contain the following information:

- a) Power supply requirements,

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- b) Warm-up period to attain overall stability,
- c) Impedance,
- d) Characteristic impedance of the output connector,
- e) Requisite voltage level of external modulation signal, and
- f) Characteristics of artificial aerial to be used with the signal generator.

9.1.1 It shall also contain a complete list of parts, spares and accessories supplied or recommended for use along with a circuit diagram and operating, servicing and maintenance instructions.

9.2 A copy of the technical manual shall be furnished with each instrument.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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